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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **End - Term Examinations – MAY 2025** |
| **Date:** 22-05-2025 **Time:** 01:00 pm – 04:00 pm |

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| --- | --- | --- |
| **School:** SOE/SOCSE | **Program:** B. Tech- Physics Cycle | |
| **Course Code:** MAT1001 | **Course Name:** Calculus and Linear Algebra | |
| **Semester**: II | **Max Marks**:100 | **Weightage**: 50% |

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| --- | --- | --- | --- | --- |
| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** |
| **Marks** | **46** | **46** | **44** | **44** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*

**Part A**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Answer ALL the Questions. Each question carries 2marks. 10Q x 2M=20M** | | | | |
| **1.** | Find the sum and product of the Eigen values of | 2 Marks | L2 | CO1 |
| **2.** | Write the matrix of the quadratic form | 2 Marks | L1 | CO1 |
| **3.** | If is a square matrix of order then write the characteristic equation for the matrix. | 2 Marks | L3 | CO1 |
| **4.** | State Euler’s theorem for the homogeneous function . | 2 Marks | L4 | CO2 |
| **5.** | Define the Jacobian of with respect to | 2 Marks | L5 | CO2 |
| **6.** | Write the condition for the function is minimum at . | 2 Marks | L2 | CO2 |
| **7.** | Evaluate | 2 Marks | L1 | CO3 |
| **8.** | Evaluate | 2 Marks | L4 | CO3 |
| **9.** | Find the complementary function of | 2 Marks | L3 | CO4 |
| **10.** | If the roots are real and distinct of the auxiliary equation, then write the complementary function. | 2 Marks | L2 | CO4 |

**Part B**

**Answer the Questions. Total Marks= 4 X 20 = 80M**

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| --- | --- | --- | --- | --- | --- |
| 11. | a. | Find the rank of the matrix by reducing into row echelon form. | 5 Marks | L4 | CO1 |
|  | **b.** | Verify Cayley Hamilton theorem, find and for the matrix | 10 Marks | L3 | CO1 |
|  | **c.** | Solve  by Gauss Elimination method. | 5 Marks | L2 | CO1 |
| Or | | | | | |
| 12. | **a.** | By an orthogonal transformation, reduce the Quadratic form to a canonical form. Find its nature, rank, signature and index. | 20 Marks | L4 | CO1 |

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| 13. | a. | Find the extreme values of | 12 Marks | L3 | CO2 |
|  | **b.** | If prove that | 8 Marks | L4 | CO2 |
| Or | | | | | |
| 14. | **a.** | If then find . | 10 Marks | L2 | CO2 |
|  | **b.** | If then prove that . | 5 Marks | L1 | CO2 |
|  | **c.** | Expand in powers of and at up to second degree. | 5 Marks | L4 | CO2 |

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| 15. | a. | Evaluate | 8 Marks | L3 | CO3 |
|  | **b.** | Prove that | 12 Marks | L4 | CO3 |
| Or | | | | | |
| 16. | a. | Evaluate . | 5 Marks | L3 | CO3 |
|  | **b.** | Evaluate by changing the order of integration. | 5 Marks | L2 | CO3 |
|  | **c.** | Evaluate using beta function. | 10 Marks | L4 | CO3 |

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| 17. | a. | Solve | 3 Marks | L4 | CO4 |
|  | **b.** | Solve | 7 Marks | L3 | CO4 |
|  | **c.** | Solve | 10 Marks | L2 | CO4 |
| Or | | | | | |
| 18. | **a.** | Solve | 10 Marks | L1 | CO4 |
|  | **b.** | Solve | 10 Marks | L4 | CO4 |

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